

## Message to Energy Managers

It would be hard to improve upon the energy conservation demonstrated by USS COWPENS (CG-63). It earned a SECNAV award in 2002 for its exemplary performance in energy savings and efficiency, improving 25% over FY00, which is 15% better than other ships in its class.

President George Bush, in his State of the Union address, proposed \$1.2 billion in research funding to help develop clean, hydrogen-powered cars. The focus of this initiative is fuel cell technology, especially Proton Exchange Membrane (PEM) fuel cell technology. DON has been a leader in this technology.

Some examples of DON's PEM technology in use were featured in previous issues of *energized*, including China Lake (January 2003); NAS Patuxent River (March 2003), and NSWC Crane (August 2002).

Interested in keeping up with the fuel cell industry? Be sure to check out the featured websites on page 4. There are many free services you can subscribe to and news articles to reference.

## 2002 SECNAV Winner

# USS COWPENS Sets High Standards for Conservation

Steaming from Yokosuka, Japan, the USS COWPENS (CG-63) has set and achieved aggressive goals for energy conservation. In FY01 it became the best-performing ship in its class in the United States Navy, while operating in support of Operation NOBLE EAGLE, the war against terrorism.

The USS COWPENS conserved energy by rigorously maintaining its engineering plant, maintaining high crew energy awareness, vigilant oversight of equipment operation, and strict adherence to best engineering practices. By the end of FY01, the USS COWPENS had saved 22,428 barrels or 941,976 gallons of fuel. It posted an improvement in energy efficiency of 25% over FY00, 15% better than other ships in its class.

## Saving Without Spending

The USS COWPENS saved \$923,000 in FY01 without spending an extra dime on new equipment of any kind. The USS COWPENS' Command and energy team redoubled their efforts in FY01 to plan energy conservation

into all aspects of operations, employing vigilant maintenance, efficient use of energy related equipment, and technological innovation



USS COWPENS CG-63

in achieving greater boiler energy efficiency.

The USS COWPENS' energy-efficient performance avoided the production of nearly a

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DON Energy Awareness Website: Access the tools on the Navy Energy website for ideas, planning tips, and tools. Set your browser to <<http://energy.navy.mil>> and scroll down the left-hand column to the Awareness pick.

## First CHP PEM Fuel Cells in California Residential Use

You read under News in the January 2003 *energized* (page 3) that DON installed nine PEM fuel cells in residential applications at San Diego and China Lake. Johnson Controls, Inc. installed and is maintaining the fuel cells, which were manufactured by Plug Power of Latham, New York. The fuel cell systems are grid parallel, combined heat and power (CHP) systems. Each 5-kw unit is fueled by natural gas and uses a catalytic reformer to first convert the natural gas to hydrogen. Plug Power says this is the first use of their fuel cells for residential applications in California. In June, 2002, the California Energy Commission certified Plug Power's 5-kw stationary fuel cell system as compliant with the requirements of California's "Rule 21" grid interconnection standard.

### NAS Patuxent River Demonstrates H Power PEM Fuel Cells—An Update

In the March 2003 issue of *energized* we featured the PEM fuel cell test project at NAS Patuxent River. In early 2003, during one of the worst snow storms to hit the region in recorded history, the propane-fueled test unit ran for nearly a month straight between failures, outperforming by far the period between down times of its major competitor—the diesel generator. On 25 March 2003, the fuel cell manufacturer, H Power, and a competitor, Plug Power, announced that they had completed their previously announced merger transaction. Both test units are currently down, and NAS Patuxent River is waiting to see how the project will continue under the new fuel cell manufacturer. Stay tuned.

# State of the Union—A Hydrogen-Fueled Future

In his State of the Union Address, President George Bush addressed the nation, saying, "I ask you to take a crucial step and protect our environment in ways that generations before us could not have imagined. In this century, the greatest environmental progress will come about not through endless lawsuits or command-and-control regulations, but through technology and innovation.

"Tonight I'm proposing \$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles. A simple chemical reaction between hydrogen and oxygen generates energy, which can be used to power a car, producing only water, not exhaust fumes. With a new national commitment, our scientists and engineers will overcome obstacles to taking these cars from laboratory to showroom, so that the first car driven by a child born today could be powered by hydrogen, and pollution-free. Join me in this important innovation to make our air significantly cleaner, and our country much less dependent on foreign sources of energy."

The hydrogen fuel initiative will include \$720 million in new funding over the next five years to develop the technologies and infrastructure to produce, store, and distribute hydrogen for use in fuel cell vehicles and electricity generation. Combined with the FreedomCAR (Cooperative Automotive Research) initiative, President Bush is proposing a total of \$1.7 billion over the next five years to develop hydrogen-powered fuel cells, hydrogen infrastructure and advanced automotive technologies.

### How Does DON Support the President's Initiative?

The Department of the Navy has been at the forefront of fuel cell technology, particularly Proton Exchange Membrane (PEM) fuel cell technology, which is receiving much of the focus of the President's initiative. Let's highlight some of DON's technological innovations and "firsts" dealing with PEM technology.

General Electric (GE) invented PEM fuel cell technology in the mid-1950s. GE-supplied PEM fuel cells were the first fuel cells used in space, powering seven of the Gemini Project spacecraft. Did you know, however, that DON helped GE develop some of their earliest PEM fuel cells?

The U.S. Navy's Bureau of Ships (Electronics Division) and the U.S. Army Signal Corps contracted with GE in the 1960s to develop a compact and portable fuel cell for field communications applications. Under this contract, GE developed a PEM fuel cell fueled by hydrogen generated by mixing water and lithium hydride. The fuel mixture was contained in disposable canisters that could be easily supplied to personnel in the field. The unit was expensive and did not last long, and thus was never mass produced. But in the 1980s when a different membrane developed by Dupont enabled PEM fuel cells to last a lot longer, and work by Los Alamos National Laboratory and others developed processes that drastically reduced the amount of expensive platinum catalysts, PEM fuel cells exhibited tremendous potential to provide cost-effective power generation for terrestrial and vehicular applications.



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# China Lake to Demonstrate Solar-Powered Fuel Cell

The Department of the Navy plans to demonstrate and test later this year a solar-powered, 1-kw regenerative PEM fuel cell system at the Naval Air Weapons Station China Lake.

Through a contract with Jacobs Sverdrup Technology, Inc., DON will demonstrate a regenerative fuel cell fueled by hydrogen derived from water split by solar energy. Proton Energy System, Inc., manufacturer of an array of products used in hydrogen generation and fuel cell applications, and Northern Power Systems, which specializes in reliable power generation including renewable energy applications, are key players on the project.

This unique system will integrate Proton's UNIGEN® Regenerative Fuel Cell System—a HOGEN® hydrogen generator, hydrogen storage tanks, and a PEM fuel cell—and a photovoltaic array supplied by the Navy. The HOGEN hydrogen generator will incorporate Proton's patent-pending renewable interface, which is capable of producing hydrogen from water using electricity directly generated by the solar array.

Testing should begin at China Lake later this year. During a six-month test program, the system will supply power during daylight hours using its solar panels, while simultaneously using some of the solar electricity to generate hydrogen and store the hydrogen in tanks. During nighttime hours, the system will regenerate the hydrogen produced from sunlight and create clean electrical power through a PEM fuel cell with the only emission being water, which is recycled to create hydrogen from the sun again.

The goal of the project is to demonstrate grid independent, constant power output using a renewable energy system capable of remote operation. Other project goals include eliminating a battery or other bridging device and eliminating the need to replenish water.

"This project will be a demonstration of a truly sustainable energy system," said Proton Energy System's President and CEO Walter "Chip" Schroeder. "In the near term, it could solve the vexing challenge of providing electrical power to remote locations and ultimately has the potential to reduce our dependence upon imported oil and increase homeland security."



**USS COWPENS**, from page 1

million gallons of fuel. That reduced pollution associated with the fuel extraction, refinement, transportation, transfer and burning of fuels. It avoided tons of emissions that otherwise would have come from burning more than a million gallons more fuel. It extended the material life of equipment, reducing down time and overhaul cost. And, as it became more conservation aware, the entire ship became less energy intense and cleaner throughout the operations structure.

## Ship-Wide Conservation

The USS COWPENS promoted conservation through weekly energy and electrical safety notes. Division Officers placed heavy emphasis on energy in zone inspections. All Officers of the Deck received training in optimum plant configurations. In addition, Enlisted Surface Warfare Specialist lectures incorporated energy efficient engineering as daily topics. Energy conservation is also enhanced through space inspections by Division Officers and the Leading Chief Petty Officer, who constantly report on energy efficiency issues.

The ship incorporated energy planning into virtually all aspects of the ship's operations. The Engineer Officer provided constant vigilance of engineering plant status and was responsible for effective communication with the Commanding Officer. This high level of attention to detail in meeting propulsion requirements in the most efficient manner while maintaining effective routine maintenance allowed for the least impact on operational capability.

The USS COWPENS' comprehensive approach to energy efficiency, from engineering for fuel savings, to daily Best Energy Practices, provide a roadmap that may be used by energy managers of all kinds of Federal and other facilities. The USS COWPENS made energy-saving best practices and comprehensive energy surveys a part of its mission and culture. This mindset and these actions, coupled with a full appreciation and willingness to communicate the value of conservation at every opportunity earned them the SECNAV award in 2002.

## Remember ENERGY STAR® OnLine!

DON energy managers have access to online interactive energy savings expertise from EPA's ENERGY STAR program. Go to [www.energystar.gov](http://www.energystar.gov) and click on "for government." That brings you to a page that provides access to Interactive Tools, Resources and Recognition. Click on the "ENERGY STAR Presentations" line in the box on the right side of the screen.

The page provides regularly updated listings of free technical presentations delivered via conference call and the Internet each month. DON energy managers can view the slide presentation and participate individually using your own computer and office phone, or gather energy team personnel around a phone and computer.

These interactive sessions cover financing options for energy efficiency projects, building energy upgrades, ENERGY STAR product procurement, and the process and benefits of benchmarking your portfolio of buildings.



## Check It Out



Do you want to keep abreast of the rapidly changing events surrounding fuel cells? Then check out the following websites:

Subscribe to EyeforFuelCells at <http://www.eyeforfuelcells.com/> and receive free e-mails on fuel cell news and events. You can select from among the following free services:

Eyeforfuelcells Daily, with daily text-based headlines;

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Visit Fuel Cell Today at <http://www.fuelcelltoday.com/index/> to read fuel cell news articles or register to receive Fuel Cell Today's regular free e-newsletter, or to participate in the Fuel Cell Today community and contribute to the Discussion Boards.

And don't forget the fuel cell sites we've featured in past issues:

<http://www.dodfuelcell.com/>

*DOD Fuel Cell Demonstration Program with Phosphoric Acid (PAFC) Fuel Cell Demonstration and Residential Proton Exchange Membrane (PEM) Fuel Cell Demonstration*

<http://www.hfcletter.com/>

*Hydrogen and Fuel Cell Letter*

<http://www.usfcc.com/>

U.S. Fuel Cell Council offering the monthly e-mail Fuel Cell Connection in Rich Text Format and the quarterly e-mail Fuel Cell Catalyst, a PDF attachment.

# energized

## Watts News?

**We want to hear from you.**

*Tell us about the energy initiatives you're working on, the problems you encounter, and the solutions you discover.*

Submit article ideas, comments, or questions to:

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*Be sure to include your name and commercial phone number.*

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